

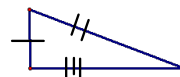
4.1 Apply Triangle Sum Properties

Classify Triangles

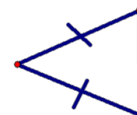
- By Sides
- By Angles

By Sides

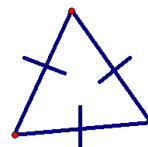
- Scalene
- No congruent sides



- Isosceles
- 2 congruent sides

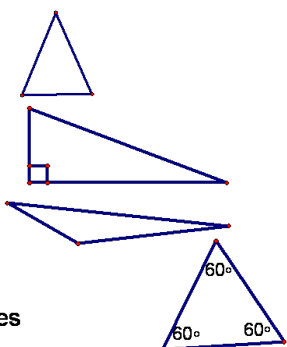


- Equilateral
- 3 congruent sides



By Angles

- Acute
 - 3 acute angles
- Right
 - 1 right angle
- Obtuse
 - 1 obtuse angle
- Equiangular
 - 3 congruent angles



Example

Classify the triangle by sides.

 $\triangle ABC$ A(-5, -2) B(1, 4) C(1, -2)

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$AB = \sqrt{(1 - -5)^2 + (4 - -2)^2} = \sqrt{72} = 6\sqrt{2}$$

$$BC = \sqrt{36} = 6$$

$$AC = \sqrt{36} = 6 \quad \text{isosceles}$$

Is it a right triangle?

yes
check slopes to see if any are \perp

Example

Classify the triangle by sides.

 $\triangle AMY$ A(-3, 4) M(3, 1) Y(0, -2)

$$AM = \sqrt{45}$$

$$MY = \sqrt{18}$$

$$AY = \sqrt{45}$$

isosceles

Is it a right triangle?

$$\overleftrightarrow{AM} \quad m = \frac{3}{-6} = -\frac{1}{2} \quad \overleftrightarrow{MY} \quad m = \frac{3}{3} = 1$$

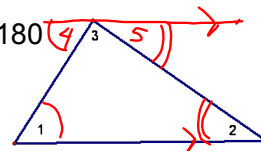
$$\overleftrightarrow{AY} \quad m = \frac{6}{-3} = -2$$

No \perp segments

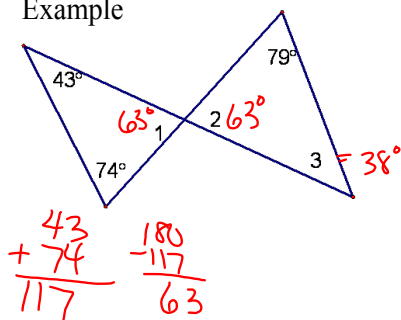
Theorem 4.1—Triangle Sum

Theorem—the sum of the measures of the angles of a triangle is 180 degrees

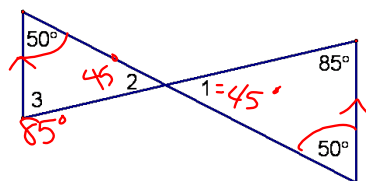
$$m\angle 1 + m\angle 2 + m\angle 3 = 180$$



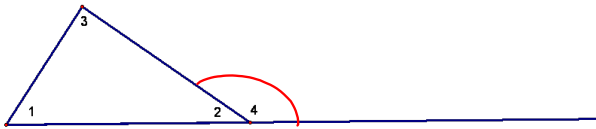
Example



Example



What is = to 180?



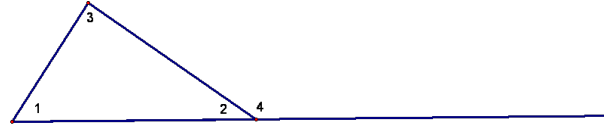
$$m\angle 1 + m\angle 2 + m\angle 3 = 180$$

$$180 = m\angle 2 + m\angle 4$$

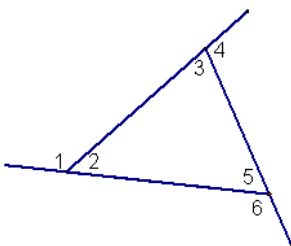
$$m\angle 1 + m\angle 2 + m\angle 3 = m\angle 2 + m\angle 4$$

$$m\angle 1 + m\angle 3 = m\angle 4$$

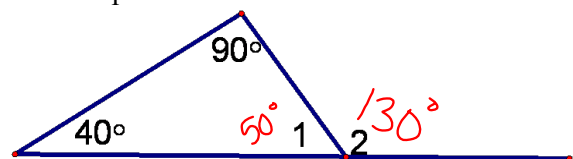
Theorem 4.2—Exterior Angle Theorem—The measure of an exterior angle of a triangle = the sum of the 2 remote interior angles.



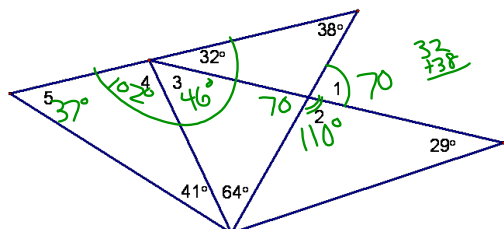
$$m\angle 1 + m\angle 3 = m\angle 4$$



Example



Find the measures of the numbered angles.



Corollary- Statement that can be easily proven

Corollary — The acute angles of a right triangle are complementary



$\angle 1 + \angle 2$ are compl.

Homework

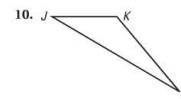
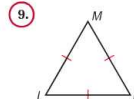
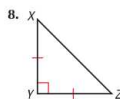
- p. 221-222 #s 1-11, 17-19, 21-26, 32-34

VOCABULARY Match the triangle description with the most specific name.

- | | |
|--|----------------|
| 1. Angle measures: $30^\circ, 60^\circ, 90^\circ$ | A. Isosceles |
| 2. Side lengths: 2 cm, 2 cm, 2 cm | B. Scalene |
| 3. Angle measures: $60^\circ, 60^\circ, 60^\circ$ | C. Right |
| 4. Side lengths: 6 m, 3 m, 6 m | D. Obtuse |
| 5. Side lengths: 5 ft, 7 ft, 9 ft | E. Equilateral |
| 6. Angle measures: $20^\circ, 125^\circ, 35^\circ$ | F. Equiangular |

7. ★ **WRITING** Can a right triangle also be obtuse? Explain why or why not.

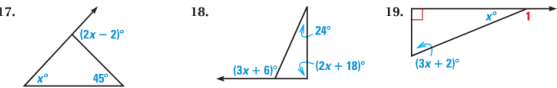
CLASSIFYING TRIANGLES Copy the triangle and measure its angles. Classify the triangle by its sides and by its angles.



COORDINATE PLANE A triangle has the given vertices. Graph the triangle and classify it by its sides. Then determine if it is a right triangle.

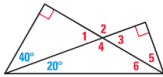
11. $A(2, 3), B(6, 3), C(2, 7)$

ALGEBRA Find the measure of the exterior angle shown.



ANGLE RELATIONSHIPS Find the measure of the numbered angle.

21. $\angle 1$ 22. $\angle 2$
23. $\angle 3$ 24. $\angle 4$
25. $\angle 5$ 26. $\angle 6$



ALGEBRA In Exercises 32–37, find the values of x and y .

